

WHAT IS CLAIMED IS:

1 1. A single electron transistor device comprising:
2 a source;
3 a drain;
4 a gate having a gate area; and
5 silicon nanoparticles implanted in said gate area.

1 2. The single electron device according to claim 1, further comprising a
2 buried gate contact to electrically stimulate said silicon nanoparticles separately from a
3 contact to said gate.

1 2. The single electron device according to claim 1, wherein said silicon
3 nanoparticles have a diameter of approximately 1 nm.

1 2. The single electron device according to claim 1, wherein said silicon
3 nanoparticles exhibit an energy spacing of approximately 1 eV.

1 2. A method for operating a single electron device, which has a source, a
3 drain, a gate having a gate area, and at least silicon nanoparticles implanted in the gate area,
4 comprising the steps of:

5 3. creating at least one electron hole in the silicon nanoparticles to enable the
6 silicon nanoparticles to conduct a single electron at room temperature across the source and
7 the drain; and

8 4. applying a voltage across the drain and the source.

1 6. The method of operating the single electron device according to claim
2 4, wherein said step of creating an electron hole in said silicon nanoparticles is accomplished
3 by irradiating said silicon nanoparticles.

1 7. The method of operating the single electron device according to claim
2 5, wherein said step of creating an electron hole uses light having a spectral width between
3 300nm and 600nm.

1 8. A transistor memory device comprising:
2 a source;
3 a drain; and
4 a gate, said gate having a gate area with silicon nanoparticles contained in a
5 control oxide and separate from a tunnel oxide disposed between said source and drain.